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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
VERIFICATION OF TRANSLATION

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Sir:

I, Atsunori Murata, of 1-14 Higashi-hiratsuka-cho, Naka-ku, Hiroshima 730-0025
declare:

- (1) that I know well both the Japanese and English languages;
- (2) that I translated the Japanese document entitled "Ink cartridge for use with an ink jet recording apparatus" from Japanese to English;
- (3) that the attached English translation is a true and correct translation of the above-identified Japanese document to the best of my knowledge and belief; and
- (4) that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 USC 1001, and that such false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated: October 21, 2002

Atsunori Murata
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[Name of Document] Specification

[Title of the Invention] Ink cartridge for use with an inkjet recording apparatus

What is claimed is:

[Claim 1]

An ink cartridge for use in an ink jet recording apparatus, comprising:
an ink cartridge is composed of a container, stored in a carriage holder, prepared with an ink chamber where ink is absorbed and stored by a porous member, communicating via the ink supply needle and ink supply port with a recording head installed on the said carriage, and a bottom portion of the side wall of said container body is narrowed by side walls projecting to the central area.

[Claim 2]

The ink cartridge for use with an ink jet recording apparatus according to claim 1, wherein the long side of said side walls are narrowed by side walls projecting to the central area.

[Claim 3] The ink cartridge for use with an ink jet recording apparatus according to claim 1, wherein the bottom portion of the side walls of said container body are narrowed by side walls projecting via slopes to the central area.

[Claim 4] The ink cartridge for use in an ink jet recording apparatus according to claim 1, wherein said porous member is strongly compressed at the central area of the bottom portion rather than at both end sides of said container or at the vicinity of the opening portion of said container body.

[Claim 5] The ink cartridge for use in an ink jet recording apparatus according to claim 1, wherein said ink supply port is communicated with via a concave portion, formed in a projection extending to the substantially central portion of the long side of said container body.

[Detail Description of the Invention]

[0001]

[Field of the Art]

The invention relates to an ink cartridge for supplying ink to a recording head. The ink cartridge is mounted on a carriage in which a recording head for jetting ink droplets is attached.

[0002]

[Related Art]

An ink jet recording apparatus prints images of photo-like quality with a relatively simple structure, so that it is widely used as a recording apparatus for personal use. This type of recording apparatus is constructed so that normally, by installing a cartridge in a carriage's cartridge holder, ink is supplied to the recording head via an ink supply needle. On the other hand, by improving an ink jet recording head and ink, the volume of ink droplet required to print one (1) dot can be minimized, ensuring that even a cartridge with a low volume can reliably print the same volume as that of a normal cartridge.

[0003]

[Problem to be solved by the invention]

When the size of a cartridge is minimized too much in this way, problems result such as difficulties with the installation and removal from a cartridge holder, and difficulties with manufacturing. In order to solve these problems, as shown in Japanese published application no. 9-262988, a filler is inserted in the bottom of a container body composing an ink cartridge with a normal volume so as to decrease the amount of filled ink. However, because the materials used for the structure of the cartridge are wasted, cost increases are incurred. In the present invention, in view of such issues, the objective is to provide an ink cartridge for use with an ink jet recording apparatus,

with a reduced volume, while avoiding difficulties with materials waste, installation and removal operations.

[0004]

[Means for solving problem]

To eliminate these problems, in the present invention, an ink cartridge is composed of a container body, in which an ink chamber is prepared, communicating via an ink supply port with an ink supply portion of a recording head installed on a cartridge, a porous member stored in the ink chamber for absorbing and holding ink, and a lid member which seals the opening of said container body. The bottom portion of the side walls of said container body is narrowed by side walls projecting to the central area.

[0005]

[Effect]

The upper portion area of a container, which is grasped during installation and removal from the holder, becomes larger and easier to manipulate. Because of this, and the fact that the bottom portion of a container is constricted by the slopes, filling of a porous member from the opening portion becomes easy.

[0006]

[Embodiment of the invention]

What follows is an explanation based on an embodiment illustrating the details of the present invention. Figs. 1 and 2 both show an embodiment of the container comprising the present invention, an ink cartridge for use with an ink jet recording apparatus. Also, Fig. 3 shows the disassembly of an embodiment of the present invention, the ink cartridge. A container 1, formed as a substantially perpendicular parallelepiped, has an opening portion 2 on the upper side, and an ink supply port 4 is formed on the bottom side such that it is positioned towards the short side wall 3.

[0007]

The other edge of the ink supply port 4 protrudes from the bottom of the container body 1, and connects with a projection 5, extending to the central area of the long side walls. On the upper surface of the projection 5, a concave portion 6 is formed, and a filter 7 is provided at the upper edge.

[0008]

Both the long side walls 8 and 9 are formed so as to have the same cross sectional shape as the opening portion, from the opening portion 2 to a predetermined height. The width of the lower portion area below this is narrowed so as to protrude to the storage chamber from the area facing the ink supply port 4. Side walls 13 and 14 are formed so as to make a concave portion connected via slopes 11 and 12.

[0009]

In such a constructed container body, as shown in Fig. 3, a porous member 15, which can absorb and hold ink like a sponge and which is substantially parallelepiped with a slightly larger cross-sectional area than the opening portion 2, is pressed into the container and filled.

[0010]

In the above-mentioned embodiment, the container body 1, which comprises the cartridge, is narrowed only in the portion below the opening portion 2 and in the central area. The opening 2 and both long side walls are formed to be wide. Therefore, when the porous member 15 is pressed from the upper portion, the slopes 11 and 12 guide the central area of the porous member 15 as shown in Fig. 4 (a). Also, since both long sides of the container body 1 are wide, the porous member is relatively easy to move to the bottom without blocking or other problems.

[0011]

Therefore, the porous member 15 moves as shown in Fig. 4 (b) to the bottom of the container body until the filter 7 reliably compresses the edge sides, and the corners of the container body are filled.

[0012]

After inserting the porous member 15, the opening portion 2 is sealed with a lid member 16 (Fig. 3), forming the ink cartridge. Regarding the seal between the lid member 16 and the container body 1, the lid member 16 is pressed to the rim of the opening portion of the container body 1, and fused to the container body 1 by impressing it with ultrasonic vibration.

[0013]

After constructing the sealed container body 1 described as above, as is commonly known, a sealing film is attached to the ink supply port 4, and the container body is housed under reduced pressure. Fully degassed ink is injected from an ink injecting port 19, formed in the lid member 16. Finally, a film 18 is applied to the outer surface of the lid member 16 so as to seal the ink injecting port 19 and an air communicating port 17, and the ink cartridge is complete.

[0014]

When mounting in a holder of a carriage, a memory device 20 is provided at one of the short side walls in the vicinity of the ink supply port 4 in this embodiment, a location in which contact with the outside is easily formed. As shown in Fig. 5, the memory device 20 comprises electrodes 22, forming contact with outside contacts, on the outer surface of a circuit board 21, and a semiconductor memory element 23, connecting with the electrodes 22, on the back of the circuit board.

[0015]

The memory device 20 stores information regarding a cartridge, such as the manufacturing number, the date of manufacture, the type of ink, and the volume of ink. The information is readable from a recording apparatus via the electrodes 22. Also, when a writable element is used in the semiconductor memory element 23, the amount of residual ink can be written so as to reliably control the ink consumption.

[0016]

In this ink cartridge, the opening portion 2 and other upper areas are the same width as the opening portion 2, and the lower area is constricted. Therefore, the lower side of a porous member 15, formed as a parallelepiped, is strongly compressed, creating a strong capillary force. Accordingly, when ink is consumed by printing or others, ink absorbed and held in the upper portion having wide cross-section, is drawn reliably to the ink supply port 4 by the capillary force, and the ink is effectively used without running out midway.

[0017]

Also, even if an ink cartridge with less ink volume is made so as to correspond to high speed printing by decreasing the inertia of the carriage, the upper area that is handled when installing to the carriage can be made to a predetermined size so as to be easily gripped.

[0018]

[Effect of the invention]

As explained above, in the present invention, the side walls protruding to the central area via slopes narrow the bottom sides of the long side walls of a container body. Therefore, the area that is gripped for attachment or removal is not unnecessarily small, making handling easy, and a porous member can be reliably inserted to the container body just by pressing on it, making it possible to easily produce an ink cartridge with a small volume.

[Brief explanation of the drawings]

Figs. 1 (a) and (b) both show an embodiment of the ink cartridge of the present invention, a perspective view with the lid member removed.

Figs. 2 (a) and (b) show an upper surface view of the bottom structure of the ink cartridge in Fig.1, with the lid member removed, and a cross sectional view along line A-A.

Fig. 3 shows a perspective assembly view of an embodiment of the ink cartridge in Fig.1.

Figs. 4 (a) and (b) both show the process of constructing the cartridge in which the porous member is inserted into the container body.

Figs. 5 (a) and (b) both show an embodiment in which a memory device is installed to the cartridge in Fig.1 to 4.

[Explanation of symbols]

- 1. Container body
- 4. Ink supply port
- 5. Projection
- 7. Filter
- 11, 12. Slope
- 13, 14. Side wall forming a concave portion
- 15. Porous member
- 16. Lid member
- 18 Film

[Abstract]

[Object]

The present invention provides an ink cartridge for use in an ink jet recording apparatus, which offers a reduced volume without producing difficulties with installation or removal and without wasting materials.

[Means for solving problem]

Side walls 13 and 14, projecting to the central area, narrow the bottom sides of the long side walls of a container body 1.